

**CLAIMS**

What is claimed is:

- 5     1. A vaccine comprising a non-neuroinvasive rabies virus wherein a glycoprotein gene of said non-neuroinvasive rabies virus is replaced with a glycoprotein gene of a neuroinvasive rabies virus to produce an attenuated recombinant rabies virus for vaccination.
- 10    2. The vaccine of Claim 1 wherein said vaccination comprises an oral vaccination.
3. The vaccine of Claim 1 wherein said attenuated recombinant rabies virus slows down an uptake of a rabies virus into a cell.
- 15    4. The vaccine of Claim 3 wherein said cell is a neuron.
5. The vaccine of Claim 1 wherein said glycoprotein gene of a neuroinvasive rabies virus comprises a glycoprotein gene encoding a cytoplasmic tail from a heterologous glycoprotein gene.
- 20    6. The vaccine of Claim 1 wherein said glycoprotein gene of a neuroinvasive rabies virus comprises a change in an amino acid.
7. A vaccine comprising a rabies virus wherein a pro-apoptotic gene is inserted into said rabies virus such that a pro-apoptotic protein is expressed from said pro-apoptotic gene to produce a recombinant rabies virus for vaccination.
- 25    8. The vaccine of Claim 7 wherein said pro-apoptotic gene is a cytochrome c gene.
9. The vaccine of Claim 7 wherein said vaccination is an oral vaccination.
- 30    10. The vaccine of Claim 7 wherein said pro-apoptotic protein induces an acceleration of apoptosis.

11. The vaccine of Claim 10 wherein said acceleration of apoptosis enhances an immune response against said rabies virus.
- 5 12. The vaccine of Claim 7 wherein said recombinant rabies virus vaccine attenuates the pathogenicity of a rabies virus.
- 10 13. A vaccine comprising a rabies virus wherein a pro-apoptotic gene is inserted into said rabies virus such that a pro-apoptotic protein is expressed from said pro-apoptotic gene and further wherein a glycoprotein gene of said rabies virus is replaced with a glycoprotein gene of a neuroinvasive rabies virus to produce an attenuated recombinant rabies virus for vaccination.
- 15 14. The vaccine of Claim 13 wherein said pro-apoptotic gene is a cytochrome c gene.
- 15 15. The vaccine of Claim 13 wherein said vaccination is an oral vaccination.
- 20 16. The vaccine of Claim 13 wherein said glycoprotein gene of a neuroinvasive rabies virus comprises a glycoprotein gene encoding a cytoplasmic tail from a heterologous glycoprotein gene.
17. The vaccine of Claim 13 wherein said glycoprotein gene of a neuroinvasive rabies virus comprises a change in an amino acid.
- 25 18. The vaccine of Claim 13 wherein said pro-apoptotic protein induces an acceleration of apoptosis
19. The vaccine of Claim 18 wherein said acceleration of apoptosis enhances an immune response against said rabies virus.